

11. Adjust the valve clearance as described in Chapter Three.

12. Reverse Steps 1-9 in the *Cylinder Head Removal* section to complete installation.

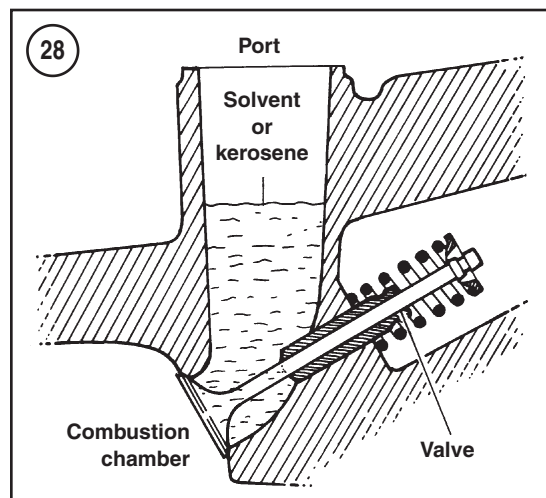
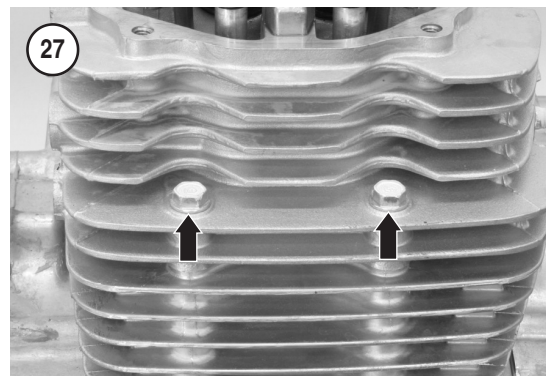
13. Tighten the upper engine hanger bolt to 54 N•m (40 ft.-lb.) and the upper engine hanger bracket bolts to 32 N•m (24 ft.-lb.).

VALVES AND VALVE COMPONENTS

A complete valve job, consisting of reconditioning the valve seats and replacing the valve guides, requires specialized tools and experience. This section describes service procedures on checking the valve components for wear and how to determine what type of service is required. Refer all valve service work requiring machine work and guide replacement to a Honda dealership.

Special Tools

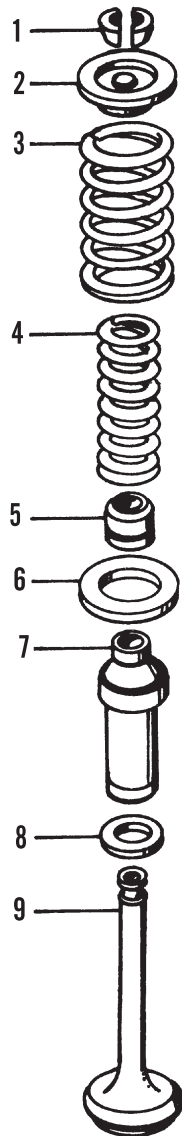
A valve spring compressor is required to remove and install the valves. This tool compresses the valve springs so the valve keepers can be released from the valve stem. Do not attempt to remove or install the valves without a valve spring compressor. Because of the limited working area found in the typical ATV and motorcycle cylinder head, most automotive type valve spring compressors will not work. Instead, rent or purchase a valve spring compressor designed for ATV and motorcycle applications.



Solvent Test

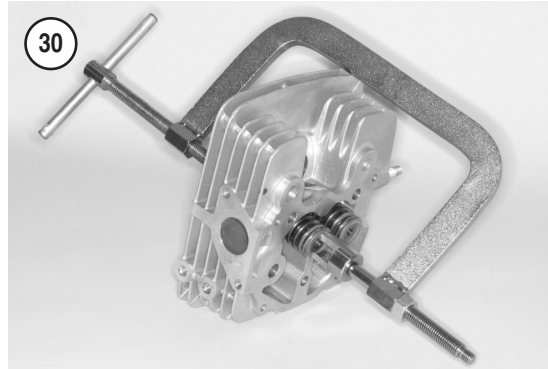
For proper engine operation, the valves must seat tightly against their seats. Any condition that prevents the valves from seating properly can cause valve burning and reduced engine performance. Before removing the valves from the cylinder head, perform the following solvent test to check valve seating.

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VALVE COMPONENTS

1. Valve keepers
2. Valve spring retainer
3. Outer valve spring
4. Inner valve spring
5. Valve stem seal
6. Spring seat
7. Valve guide
8. O-ring
9. Valve

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1. Remove the cylinder head as described in this chapter.
2. Support the cylinder so the exhaust port faces up and pour solvent or kerosene into the port (**Figure 28**). Then check the combustion chamber for fluid leaking past the exhaust valve seat.
3. Repeat Step 2 for the intake port and intake valve and seat.
4. If there is fluid leaking around a valve seat, the valve is not seating properly on its seat. The following conditions can cause poor valve seating:
 - a. A bent valve stem.
 - b. A worn or damaged valve seat (in the cylinder head).
 - c. A worn or damaged valve face.
 - d. A crack in the combustion chamber.

Removal

A valve spring compressor is required to remove and install the valves.

Refer to **Figure 29** for this procedure.

1. Remove the cylinder head as described in this chapter.
2. Install a valve spring compressor squarely over the valve spring seat with the other end of tool placed against valve head (**Figure 30**). Position the compressor head so the valve keepers can be reached and removed in Step 3.

NOTE

When compressing the valve springs in Step 3, do not compress them any more than necessary.

WARNING

Wear safety glasses or goggles when performing Step 3.

3. Tighten the valve spring compressor to remove all tension from the upper spring seat and valve keepers. Then remove the valve keepers (1, **Figure 29**) with pliers or a magnet.
4. Slowly loosen the valve spring compressor and remove it from the head.
5. Remove the valve spring retainer and both valve springs.

CAUTION

*Remove any burrs from the valve stem groove (**Figure 31**) before removing the valve; otherwise, the valve guide can be damaged as the valve stem passes through it.*

6. Remove the valve from the cylinder head.
7. Pull the valve stem seal (A, **Figure 32**) off the valve guide and discard it.
8. Remove the spring seat (B, **Figure 32**).

CAUTION

Keep all parts of each valve assembly together. Do not mix components from the different valves or excessive wear may result.

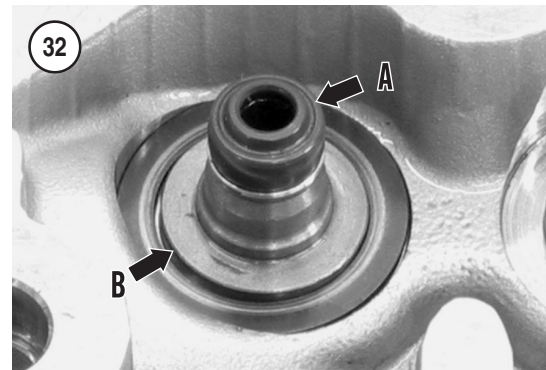
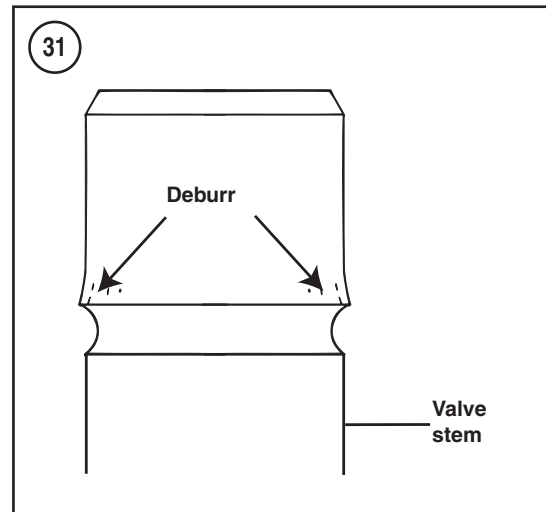
9. Repeat Steps 2-8 to remove the remaining valve.

Inspection

When measuring the valve components (**Figure 29**) in this section, compare the actual measurements to the specifications in **Table 2**. Replace parts that are out of specification or show damage as described in this section.

Refer to the troubleshooting chart in **Figure 33** when inspecting and troubleshooting the valves in this section.

1. Clean the valves in solvent. Do not gouge or damage the valve seating surface.
2. Inspect the contact surface (**Figure 34**) of each valve for burning. Minor roughness and pitting can be removed by lapping the valve as described in this section. Excessive unevenness in the contact surface is an indication that the valve is not serviceable.
3. Inspect the valve stems for wear and roughness. Measure the valve stem diameter for wear (**Figure 35**).



4. Remove all carbon and varnish from the valve guides with a stiff spiral wire brush before measuring wear.

NOTE

If the required measuring tools are not available, proceed to Step 7.

5. Measure each valve guide at its top, center and bottom inside diameter with a small bore gauge. Then measure the small hole gauge with a micrometer to determine the valve guide inside diameter.
6. Subtract the measurement made in Step 3 from the measurement made in Step 5. The difference is the valve stem-to-guide clearance. Replace any guide or valve that is not within tolerance. Refer valve guide replacement to a dealership.
7. If a small bore gauge is not available, insert each valve in its guide. Hold the valve just slightly off its seat and rock it sideways (**Figure 36**). If the valve rocks more than slightly, the guide is probably

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VALVE TROUBLESHOOTING

Valve deposits

Check:

- Worn valve guide
- Carbon buildup from incorrect tuning
- Carbon buildup from incorrect carburetor adjustment
- Dirty or gummed fuel
- Dirty engine oil

Valve sticking

Check:

- Worn valve guide
- Bent valve stem
- Deposits collected on valve stem
- Valve burning or overheating

Valve burning

Check:

- Valve sticking
- Cylinder head warped
- Valve seat distorted
- Valve clearance incorrect
- Incorrect valve spring
- Valve spring worn
- Worn valve seat
- Carbon buildup in engine
- Engine ignition and/or carburetor adjustments incorrect

Valve seat/face wear

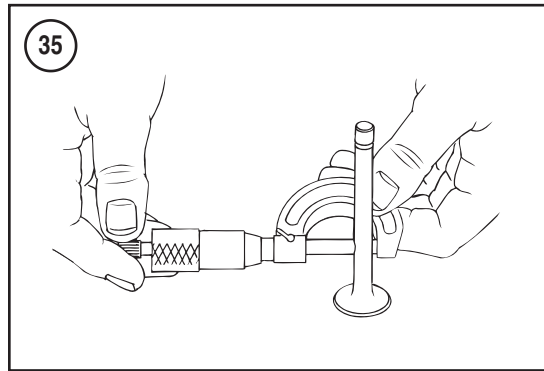
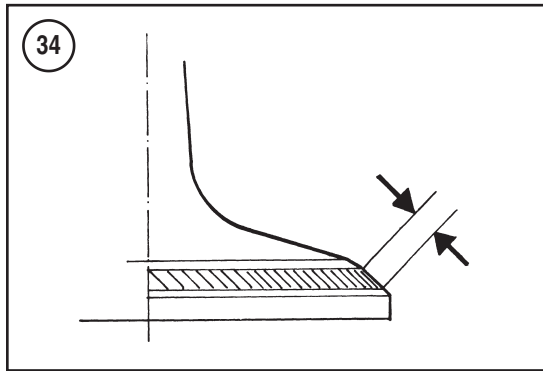
Check:

- Valve burning
- Incorrect valve clearance
- Abrasive material on valve face and seat

Valve damage

Check:

- Valve burning
- Incorrectly installed or serviced valve guides
- Incorrect valve clearance
- Incorrect valve, spring seat and retainer assembly
- Detonation caused by incorrect ignition and/or carburetor adjustments



worn. However, as a final check, take the cylinder head to a dealership and have the valve guides measured.

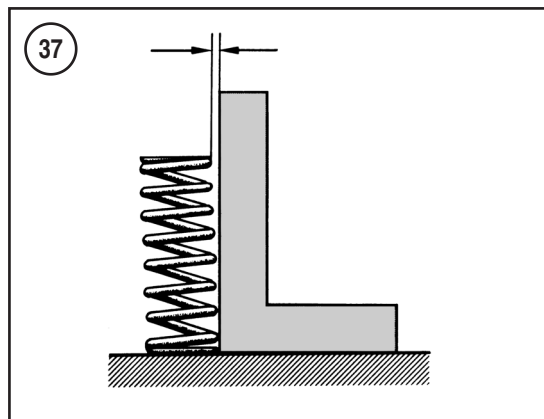
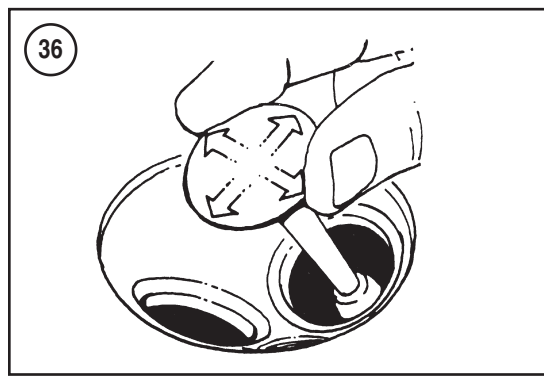
8. Check the inner and outer valve springs as follows:

- a. Check each valve spring for visual damage.
- b. Use a square and check each spring for distortion or tilt (**Figure 37**). Distortion should be minimal.
- c. Measure the valve spring free length with a vernier caliper (**Figure 38**).
- d. Replace worn or damaged springs as a set.

9. Check the valve spring seats and valve keepers for cracks or other damage.

10. Inspect the valve seats (**Figure 39**) for burning, pitting, cracks, excessive wear or other damage. If worn or burned, have them reconditioned by a machine shop. Seats and valves in near-perfect condition can be reconditioned by lapping them with fine carborundum paste. Check as follows:

- a. Clean the valve seat and valve mating areas with contact cleaner.
- b. Coat the valve seat with machinist's blue.
- c. Install the valve into its guide and rotate it against its seat with a valve lapping tool. See *Lapping* in this section.
- d. Lift the valve out of the guide and measure the seat width (**Figure 40**) with a vernier caliper.
- e. The seat width for intake and exhaust valves should be within the specifications listed in **Table 2** all the way around the seat. If the seat width exceeds the service limit, have a dealership machine the seats.
- f. Remove all machinist's blue residue from the seats and valves.

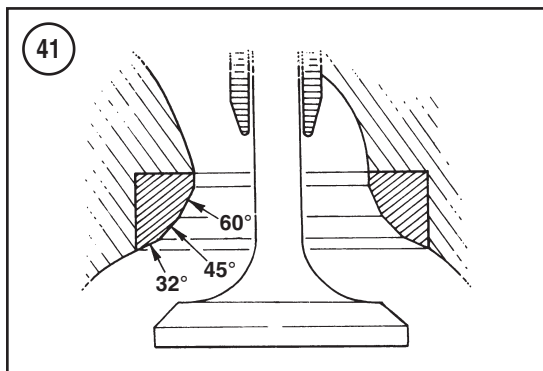
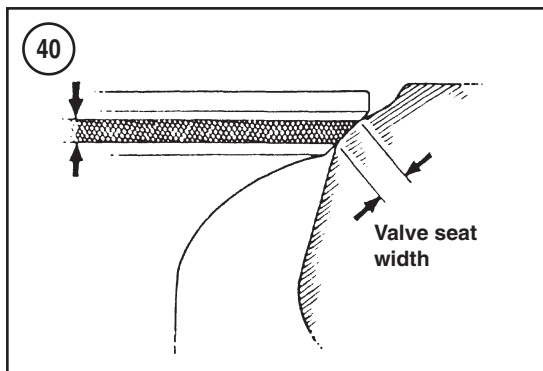
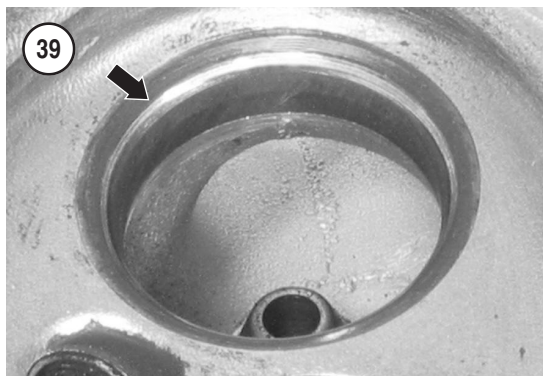
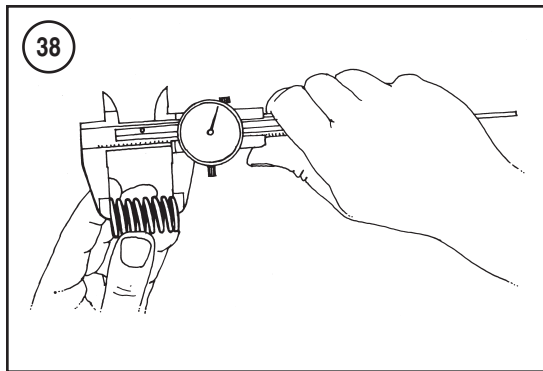


Guide Replacement

Refer valve guide replacement to a Honda dealership. Otherwise, a 5.5 mm valve guide reamer is required.

Seat Reconditioning

The valve seats are an integral part of the cylinder head and cannot be replaced separately. Valve seat



wear and damage can be repaired by cutting the seats. Refer this service to a Honda dealership. If the necessary tools and expertise are available, refer to **Figure 41** for the valve seat angles required. Refer to **Table 2** for valve seat width dimensions.

Lapping

Lapping the valves restores the valve seal without machining, if the amount of wear or distortion is not too great.

This procedure should only be performed after determining that the valve seat width and outside diameter are within specifications. See *Inspection* in this section.

1. Smear a light coat of fine grade valve lapping compound on the valve face seating surface.
2. Insert the valve into the head.
3. Wet the suction cup of the lapping stick and stick it onto the head of the valve. Lap the valve to the seat by spinning the lapping stick in both directions. Every 5 to 10 seconds, rotate the valve 180° in the valve seat. Continue this action until the mating surfaces on the valve and seat are smooth and equal in size.
4. Closely examine the valve seat in the cylinder head. It should be smooth and even with a smooth, polished seating ring.
5. Thoroughly clean the valves and cylinder head in solvent, then with hot, soapy water, to remove all lapping compound. Any compound left on the valves or the cylinder head will contaminate the engine oil and cause excessive wear and damage. After drying the cylinder head, lubricate the valve guides with engine oil to prevent rust.
6. After installing the valves into the cylinder, test the valve seat seal as described in *Solvent Test* in this section. If fluid leaks past the seat, remove the valve assembly and repeat the lapping procedure until there is no leaking. When there is no leaking, remove both valve sets and reclean the cylinder head assembly as described in Step 5.

Installation

1. Clean and dry all parts. If the valve seats were machined or lapped, or the valve guides replaced, thoroughly clean the valves and cylinder head in solvent, then with hot, soapy water, to remove all lapping and grinding compound. Any abrasive resi-

due left on the valves or in the cylinder head will contaminate the engine oil and cause excessive wear and damage. After drying the cylinder head, lubricate the valve guides with engine oil to prevent rust.

2. Install the spring seat (B, **Figure 32**).
3. Install new valve seals as follows:

NOTE

New valve seals must be installed whenever the valves are removed.

- a. Lubricate the inside of each new valve seal with molybdenum disulfide paste.
 - b. Install the new valve seal over the valve guide and seat it into place (A, **Figure 32**).
4. Coat a valve stem with molybdenum disulfide paste and install it into its correct guide.

NOTE

*Install both valve springs so the end with the coils closest together (**Figure 42**) faces toward the cylinder head.*

5. Install the inner and outer valve springs.
6. Install the valve spring retainer.

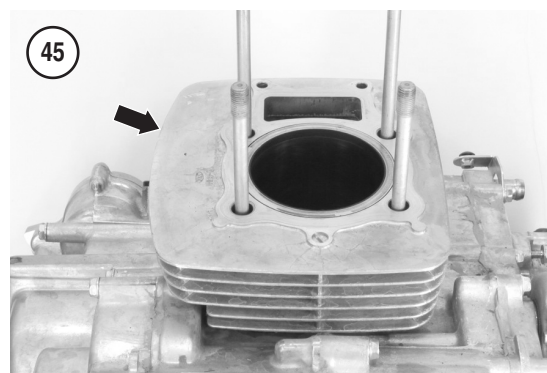
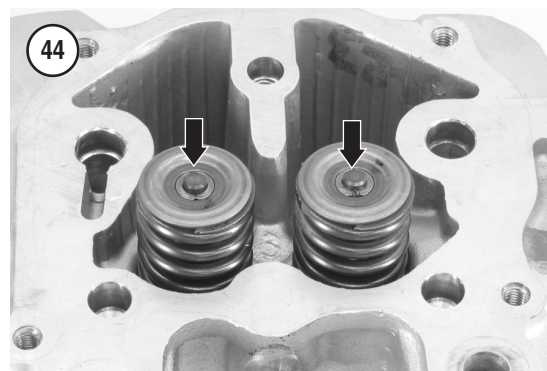
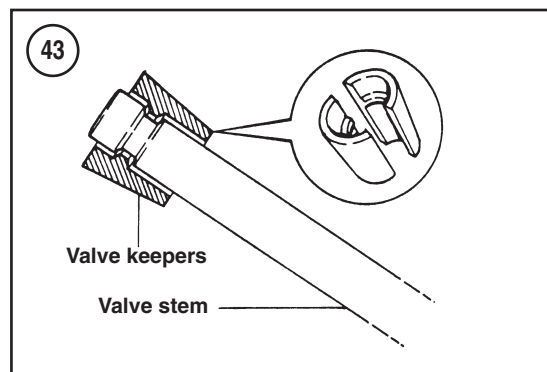
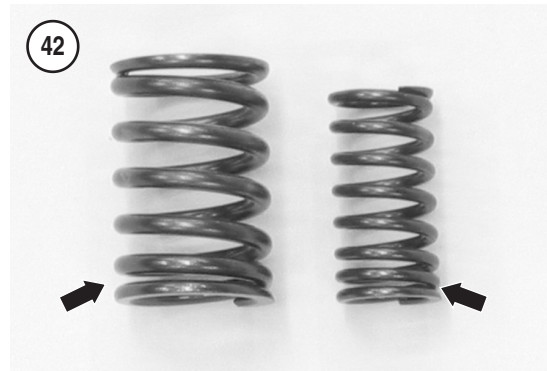
WARNING

Wear safety glasses or goggles when performing Step 7.

7. Install the valve spring compressor (**Figure 30**). Push down on the upper valve seat and compress the springs, then install the valve keepers (**Figure 43**). Release tension from the compressor and make sure the keepers seat evenly around the end of the valve. Tap the end of the valve stem (**Figure 44**) with a soft-faced hammer to ensure the keepers are properly seated.
8. Repeat Steps 2-7 for the opposite valve.
9. After installing the cylinder head and rocker arm holder onto the engine, adjust the valve clearance. See Chapter Three.

CYLINDER

The alloy cylinder has a pressed-in cast iron cylinder liner. Oversize piston and ring sizes are available through Honda dealerships and aftermarket piston suppliers.



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